

# GAS HANDLING DEVICES

Gas handlers for enhanced reliability, production improvement and less downtime in gassy applications

## APPLICATIONS

- High GLR Applications
- Gas lift – to – ESP conversion wells
- Unconventional wells with increasing GLR

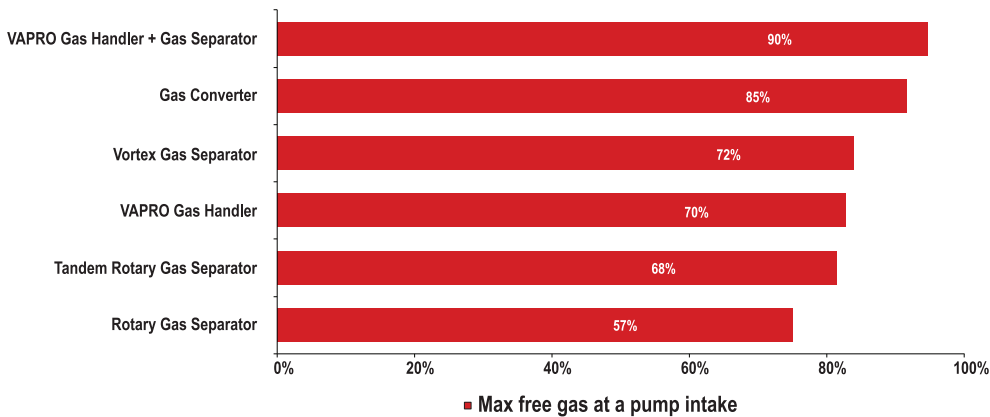
## FEATURES & BENEFITS

- High gas separation efficiency:
  - Increases production & extends ESP system application range
- Abrasion-resistant tungsten-carbide bearings & high-strength INCONEL shafts:
  - High reliability in sandy & abrasive environments
- Advanced gas-handling:
  - Increases equipment run life by eliminating gas locking
  - Improves ESP system performance by conditioning gas-liquid mixture

There is an increasing need to produce gassy wells with Electric Submersible Pumps, especially with the rapid decline curves in unconventional wells.

Borets has a broad suite of gas handling devices to address wells with varying gas to liquid ratios that typically inhibit performance through gas interference, slug flow, uneven loads, frequent trips and etc.

Rotary gas separators, Vortex gas separators, gas converters and the Vapro may be used individually or in combination depending on the application.



## OPERATING CONDITIONS

CONDITIONS	VALUES
Max. fluid S.G.	1.4
Max. kinematic viscosity of the single-phase fluid at which the pump operates without changing its head and performance, cS	1
Produced water pH	6.0 – 8.5
Max. solids percentage by weight, % (ppm)	0.1 (1,000)
Max. Mohs hardness number	7
Max. H <sub>2</sub> S, % (ppm)	0.125 (150)
Max. water cut, %	99
Max fluid temperature, °F	302*

\*Optional - up to 482 °F

## 1. GAS SEPARATORS

Rotary Gas Separators use an inducer designed to force feed well fluid in to a rotor section designed to separate the gas from the liquid.

For higher separation efficiency, a tandem gas separator is available (with two separation chambers).

The rotary gas separator operation is based on the following principle: the fluid entering the gas separator and moving into its vanes is separated into liquid and gas. The separated gas is vented to the annulus and the degassed fluid is directed into the first stage of the pump.

The Vortex Gas Separator is a dynamic gas separation device that utilizes a natural vortex

action created in a vortex chamber and providing a centrifugal gas separation. Unlike a rotary gas separator, rotors are not used. This design feature improves abrasion resistance of the vortex gas separator sleeve and decreases the risk of pumping system failures due to gas separator housing damage.

### SPECIFICATIONS

	GAS SEPARATOR TYPE	PUMP SERIES	FLOW RATE AT 60 HZ, BPD	MAX. ALLOWABLE FREE GAS CONTENT
Rotary Gas Separators	ESP 338 RGS	338	377 – 1,887	57%
Vortex Gas Separators	ESP B 400 VGS CW 3000	400	180 – 3,000	72%
	ESP B 538 VGS 9000	538	1,050 – 9,600	65%

## 2. GAS HANDLERS VAPRO

The Gas Handler VAPRO functions by reducing gas bubble sizes and changing the gas bubble distribution, homogenizing and compressing the gas-liquid mixture. This is achieved by specially design stages or an additional disperser assembly.

In high GOR well the gas handler can be assembled above the gas separator.

### SPECIFICATIONS

GAS HANDLER TYPE	PUMP SERIES	FLOW RATE AT 60 HZ, BPD	MAX. ALLOWABLE FREE GAS CONTENT (VAPRO ONLY)	MAX. ALLOWABLE FREE GAS CONTENT (VAPRO+GAS SEPARATOR)
VAPRO 750	400	150 – 720	up to 70%	up to 90%
VAPRO 3200	400	717 – 2,868		
VAPRO 5300	400	2,264 – 5,434		
VAPRO 12500	538	4,000 – 13,000		

## 3. GAS CONVERTERS

Gas Converters are designed to improve ESP system performance in high GOR wells.

Gas Converters comprise two chambers on a common shaft:

- bottom chamber – vortex separation chamber
- top – a stack of axial flow stages for free gas handling.

### SPECIFICATIONS

GAS CONVERTER TYPE	PUMP SERIES	FLOW RATE AT 60 HZ, BPD	MAX. ALLOWABLE FREE GAS CONTENT
ESP B 400 CW 750	400	180 – 750	85%
ESP B 400 CW 1750	400	750 – 1,750	
ESP B 400 CW 3000	400	900 – 3,000	

## GAS HANDLING DEVICE

GAS HANDLING DEVICE	SCALES	CORROSION *	HIGH VISCOSITY	SOLIDS	GAS SLUGS	ABOVE 3,600 RPM	BELOW 3,600 RPM
Rotary Gas Separator		+					
Tandem Gas Separator		+					
VAPRO Multiphase Pump	+	+		+	+	+	+
Vortex Gas Separator	+	+	+			+	+
Gas Converters	+	+	+		+	+	
VAPRO Multiphase Pump and Vortex Gas Separator	+	+	+		+	+	

\*Corrosion resistant design available

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